(Reference Translation)

TOPIX Risk Control Index Guidebook

Revisions made to calculation algorithm notation (no material changes made to calculation methodology).

February 2012 Version

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1．Introduction

- Based on the stock indices calculated by the Tokyo Stock Exchange, Inc. (hereafter "TSE"), the TSE calculates indices that track the return of a strategy that applies dynamic exposure to a TOPIX index in an attempt to control the level of volatility (hereafter "TOPIX Risk Control Indices") in accordance with, as a rule, the methods described in this document. When an event that is not specified in this document occurs, or if the TSE decides it is impossible to use the methods described in this document, the TSE may use an alternative method of index calculation as it deems appropriate.

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2. Outline

(1) Outline

- The TOPIX Risk Control Index is designed to track the return of a strategy that applies dynamic exposure to a TOPIX index in an attempt to control the level of volatility.
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- The TOPIX Risk Control Index includes a leverage factor that changes based on realized historical volatility. If realized volatility exceeds the target level of volatility, the leverage factor will be less than one; if realized volatility is lower than the target level, the leverage factor is set to one.
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- The TOPIX Risk Control Index is calculated on a daily basis.

(2) Target indices used for calculating TOPIX Risk Control Indices

- The following indices are used for calculating TOPIX Risk Control Indices.

Target Indices	Target Volatility Level		
TOPIX (Total Return)	5%	10%	15%

3. Calculation Method

- The daily index return (ie. the index value) is calculated by the combination of the following two returns:
  (1) The return on the position in the underlying index
  (2) The interest cost or gain

- For the changes of the Number of shares for index calculation and Base Market Value, the "TOPIX Index Guidebook" is applied and uses the same data for Target indices. The same is also applied to the prices for index calculation

- The base point and base date of indices are following.

Index	Base Date	Base Point
TOPIX Risk Control Index	1993/3/11	1000

- The realized volatility is calculated as the simple-weighted moving average

$$\text{Realized Volatility}_t = \sqrt{\frac{252}{n} * Variance_t}$$

$$Variance_t = 1/N * \sum_{i=t-N+1}^{t} \ln\left(\frac{UnderlyingIndex_i}{UnderlyingIndex_{i-n}}\right)^2$$

n = the number of days inherent in the return calculation used for determining volatility. If $n = 1$ daily returns are used, while if $n = 2$ two day returns are used, and so forth. For the TOPIX Risk Control Indices, n =1.

N = the number of trading days observed for calculating variance for the short-term volatility measure. For the TOPIX Risk Control Indices, N = 100.

- The formula for calculating the TOPIX Risk Control Index is as follows :

UnderlyingIndex $_t$	=	the level of the underlying index on day t.
UnderlyingIndex $_{t-1}$	=	the level of the underlying index as of the previous trading day.
Interest Rate $_{t-1}$	=	the interest rate set for the index. For the TOPIX Risk Control Indices, the Domestic Interbank Unsecured Overnight Call Rate for the previous business day is used.
D$_{t-1, t}$	=	the number of calendar days between the previous business day and day t.

$$RiskControlIndexValue_t = RiskControlIndexValue_{t-1} * \left[1 + \left[K_{t-1} * \left(\frac{UnderlyingIndex_t}{UnderlyingIndex_{t-1}} - 1\right) + (1 - K_{t-1}) * \left(InterestRate_{t-1} * D_{t-1,t} / 365\right)\right]\right]$$

K_{t-1} = the leverage factor set for day t set on day t-1, calculated as:

Min(Max K, Target Volatility / Realized Volatility $_{t-d}$)

Max K	=	the maximum leverage factor allowed in the Index,which is 1 for the /TOPIX Risk Control Indices.
d	=	the number of days between when volatility is observed and day t. For the TOPIX Risk Control Indices, d = 3. So the historical volatility of the Underlying Index as of the close three days prior to the index calculation date is used to calculate the leverage factor K_t
Target Volatility	=	the target level of volatility set for the Index.
Realized Volatility $_{t-d}$	=	the historical realized volatility of the Underlying Index as of the close of d trading days prior to day t, where a trading day is defined as a day on which the underlying index is calculated.

Excess Return Indices

Excess return index series are calculated for the TOPIX Risk Control Indices to take interest costs into account if both positions in the underlying index and cash are sponsored by borrowing. The formula for calculating the risk control excess return is as follows:

$$Risk\ Control\ Index\ Excess\ Return_t = K_{t-1} * \left(\frac{UnderlyingIndex_t}{UnderlyingIndex_{t-1}} - 1\right) - K_{t-1} * \left(InterestRate_{t-1} * D_{t-1,t} / 365\right)$$

4． Others

(1) Publication

- The TOPIX Risk Control Indices are published on the TSE website.

(2) License agreement

- TOPIX Risk Control Indices calculated and published by the TSE are the intellectual property of the TSE. All rights regarding such indices including but not limited to calculation, publication, dissemination, and use of TOPIX Risk Control Indices are reserved by the TSE.
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